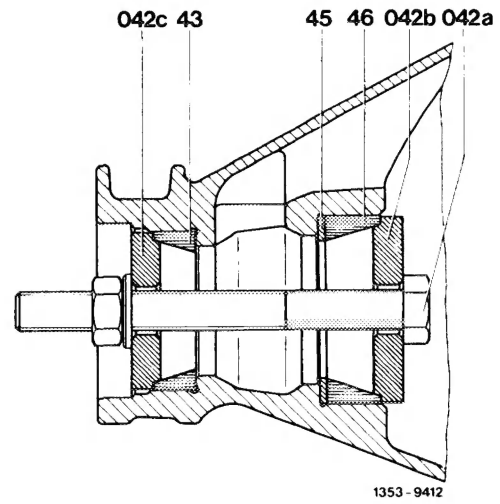
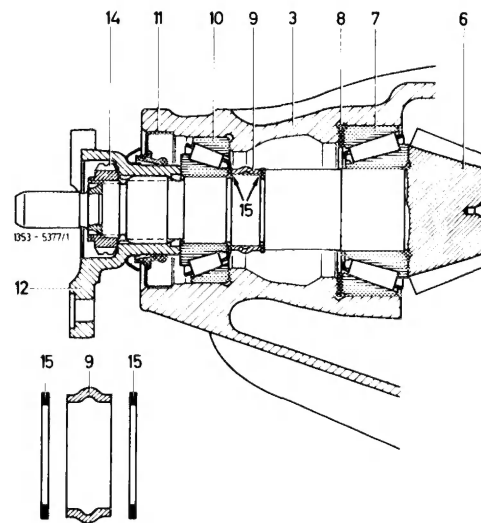


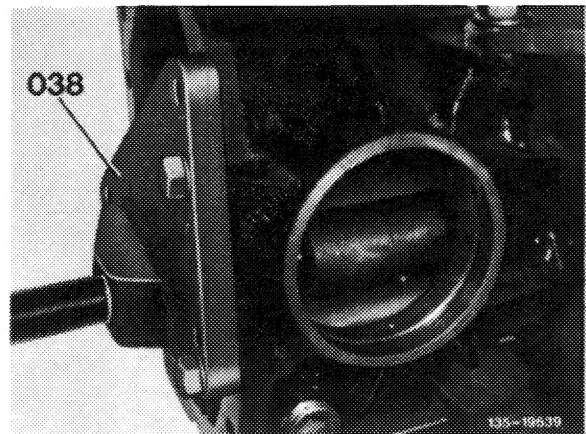
47 Insert outer races of front and rear tapered roller bearing (43 and 46) into rear axle housing by means of installer (042a—c).



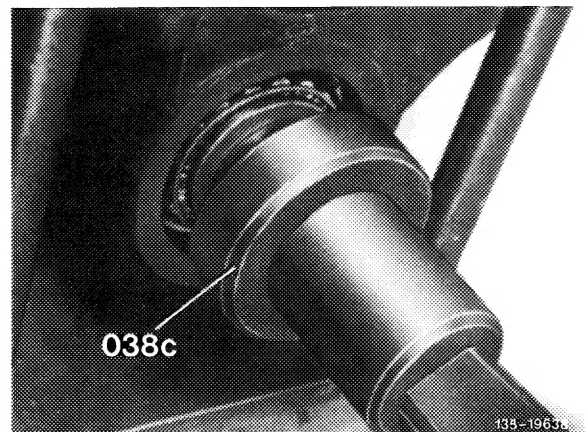
48 Add one contact washer (15) on both sides of spacing sleeve (9) and mount on drive pinion.



49 Insert drive pinion into rear axle housing and support by means of remover and installer (038).



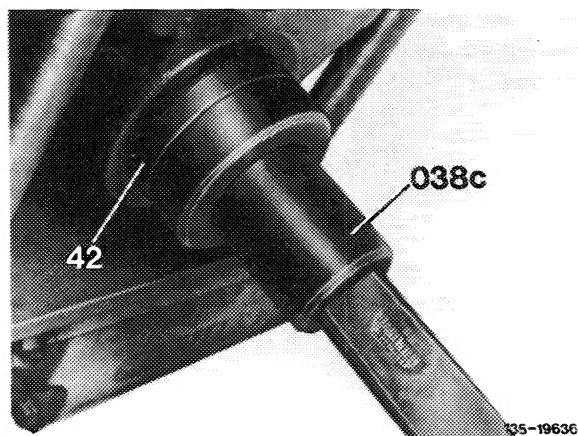
50 Insert inner race of front tapered roller bearing and knock-in with thrust piece (038c).



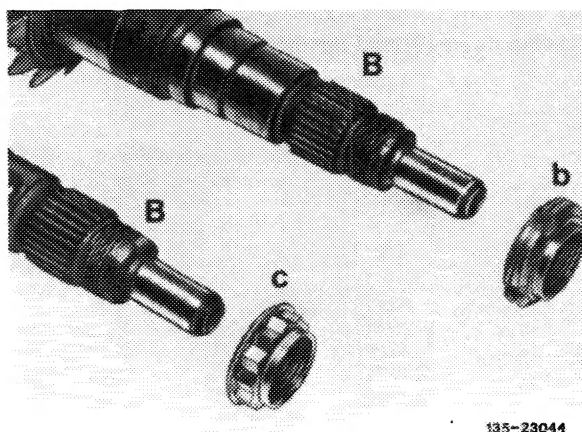
51 Remove removing and installing tools from rear axle housing.

52 Coat rubber-coated radial sealing ring (42) on circumference with hypoid gear oil or rubber sliding compound "naphtalene H" and push into rear axle housing with thrust piece (038c).

53 Coat running surface for radial sealing ring on universal flange with molybdenum disulfide paste and slip universal flange on drive pinion.

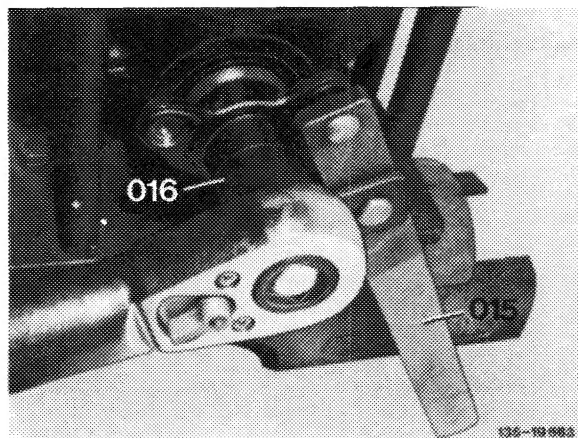


**Note:** The universal flange can be fastened on drive pinion optionally by means of a crush slot nut (b) which has a groove on circumference, or with a double hex. collar nut (c).



B = drive pinion with groove  
b = crush slot nut  
c = double hex. collar nut

54 Screw-on new crush slot nut or double hex. collar nut. Plug holding wrench (015) and slot nut socket or double hex. socket (016) on universal flange and **carefully** tighten nut until friction torque of 120–140 Ncm on new bearings and of 50–100 Ncm on used bearings has been attained.



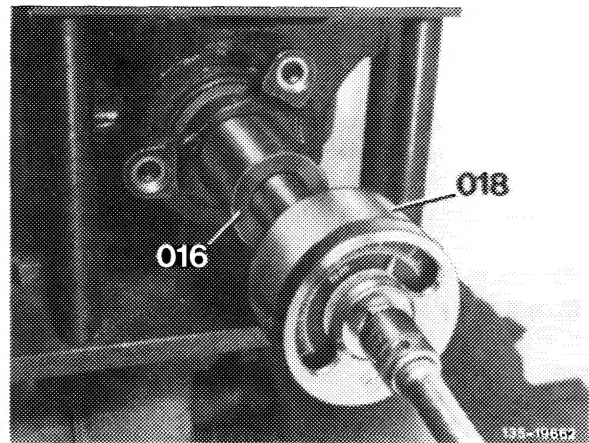
#### Attention!

When tightening slot nut or double hex. collar nut, rotate drive pinion several times and by means of light blows against rear axle housing make sure that the rollers of tapered roller bearing are easily entering into bearing races.

55 To check, plug torque measuring instrument (018) with extension on slot nut wrench or double hex. socket (016) and rotate drive pinion.

**Note:** The tapered roller bearings of drive pinion must be installed at a given preload. This preload is attained by compression of the spacing sleeve located between the bearing inner race of front tapered roller bearing and drive pinion when the slot nut or collar nut is tightened.

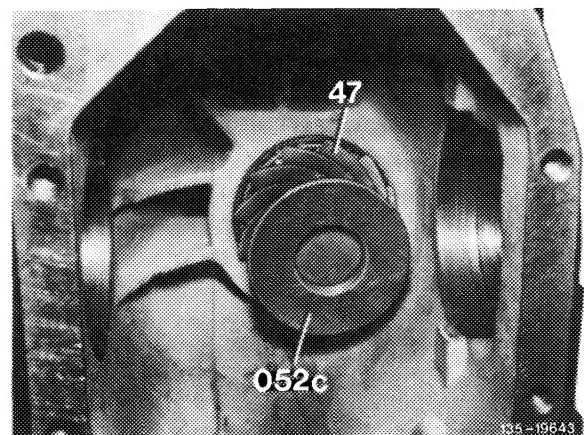
If the friction torque during rotation of drive pinion, that is, if the preload of the tapered roller bearing is too low, slightly retighten slot nut. If the specified friction torque has been exceeded, remove drive pinion again and install a **new** spacing sleeve. **Never reduce friction torque by releasing slot nut or collar nut**, since otherwise the preload of the tapered roller bearings would be too low. As a result, the drive pinion would develop play while driving, accompanied by noises in rear axle drive.



56 Place magnetic measuring plate (052c) on face of drive pinion (47) to measure adjusting dimension "A".

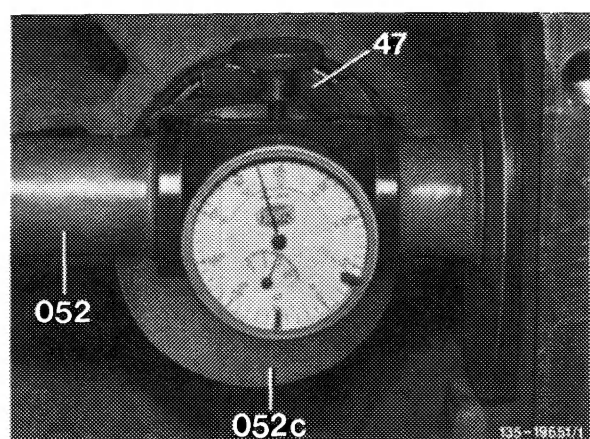
57 Insert measuring device (052) with dial gauge for checking adjustment once again from direction of righthand bore into rear axle housing.

On gear set of example named above, the dial gauge should indicate a deviation of 0.27 mm from basic dimension in plus-direction, the same dimension which is written on face of drive pinion.



The permissible basic deviation of adjusting dimension "A" should not exceed plus 0.01 and minus 0.02.

If the deviation is higher, grind down installed compensating washer once again or install a new compensating washer of required thickness. But be sure to use a **new** spacing sleeve for tapered roller bearing.



47 Drive pinion  
052 Measuring device  
052c Magnetic measuring plate

58 Remove measuring device together with dial gauge and magnetic measuring plate from rear axle housing.

59 Peen crush slot nut or double hex. collar nut with a peening tool into one of the two grooves of drive pinion in such a manner that no gap is provided between groove and locking tab.

#### Attention

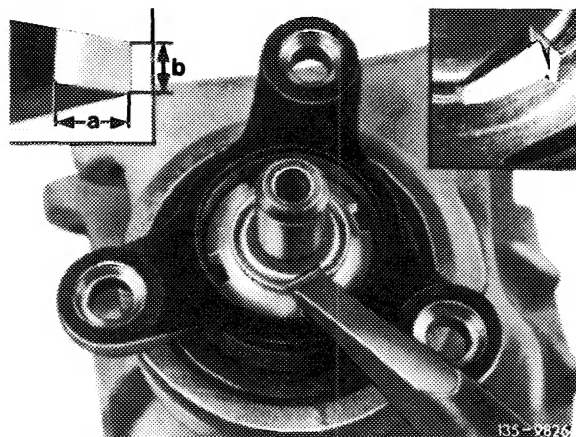
Do not apply any heavy blows in axial direction.

Crush slot nut

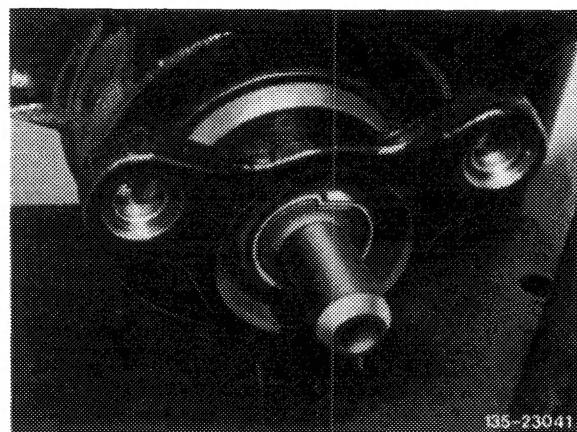
Dimension for peening tool

a = approx. 8 mm

b = approx. 4 mm



Double hex. collar nut



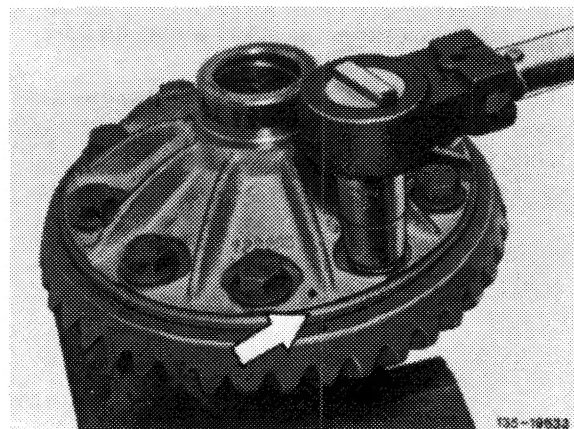
#### Adjusting backlash

**Note:** The backlash of the gear assembly and the required preload of tapered roller bearings in relation to differential bearing is attained by means of the locking rings installed in rear axle housing. Locking rings of varying thickness are available. For assembly, it will be of advantage to reinstall the previously removed locking rings again at respective side to obtain a basic position.

60 Disassemble and assemble differential (35—560).

61 Carefully clean bore of ring gear and seat on differential housing. Heat ring gear to approx. 60—70 °C and place on differential housing. Pay attention to identification marks of ring gear and differential housing, if recorded (arrow).

If ring gear cannot be placed on differential housing, assist with light hammer blows (rubber hammer).

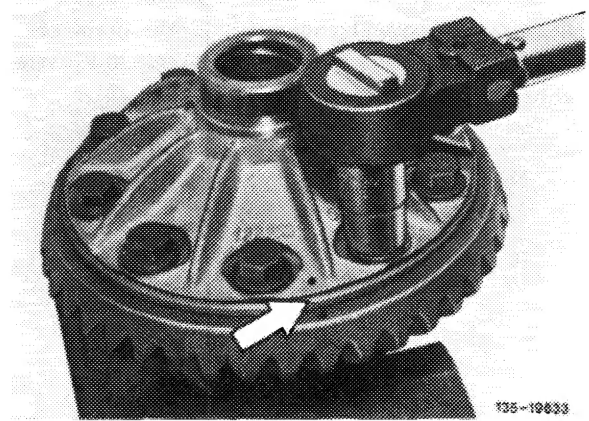




62 Crosswise tighten normal hex. screws for fastening ring gear uniformly to 80 Nm and self-locking hex. screws to 100 Nm.

**Attention!**

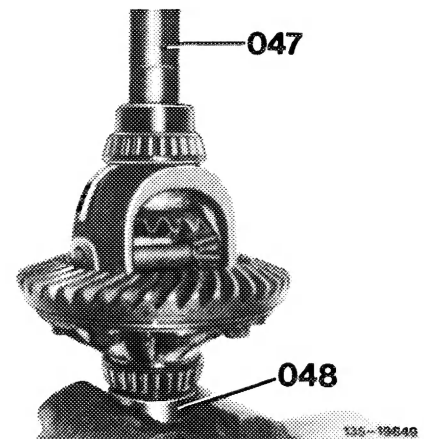
Always replace ring gear screws after one-time use.



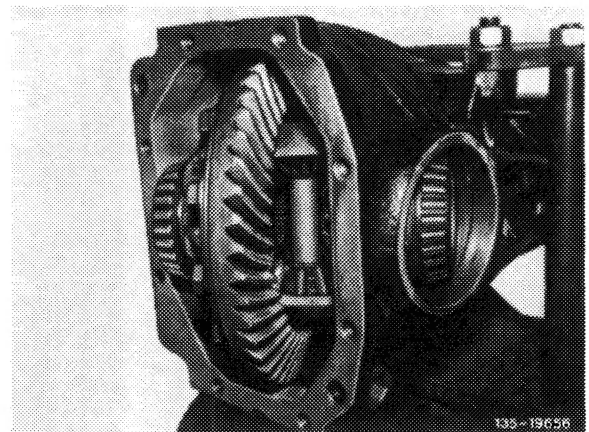
63 Press inner races of tapered roller bearings on differential housing by means of assembly mandrel (047).

**Attention!**

Use support (048) to prevent damage to roller cage when pressing-on second inner race.



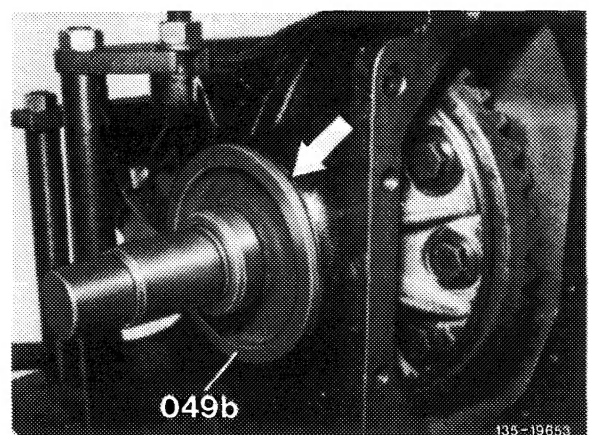
64 Insert differential into bore of rear axle housing with righthand side first, until the differential can be introduced at lefthand side.



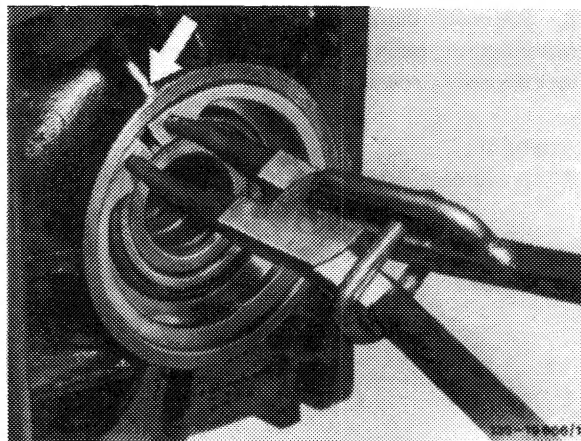
**Note:** Use two assembly mandrels for better installation of outer bearing races.

65 Locate differential by means of assembly mandrel (049b) in relation to rear axle housing.

66 Remove lefthand assembly mandrel and again introduce together with outer bearing race into rear axle housing, until assembly mandrel rests against housing (arrow).

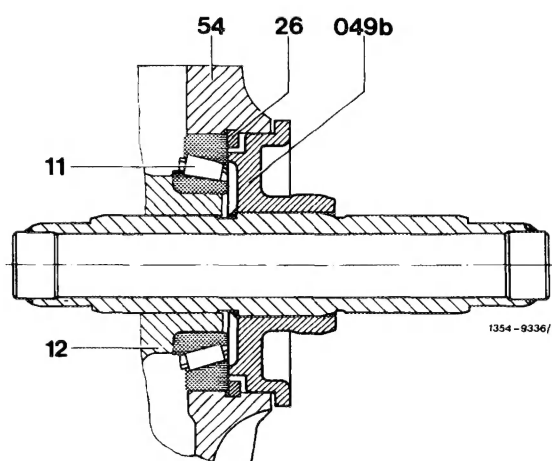


67 Remove assembly mandrel at the left. Insert previously removed locking ring into slot in such a manner that the eye of the locking ring is in alignment with the web of rear axle housing (arrow).

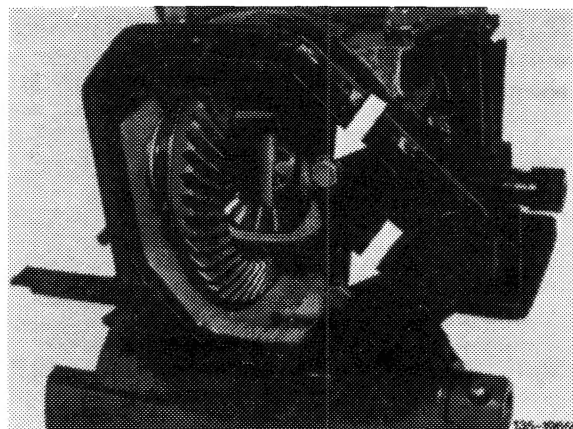


68 Check locking ring (26) for correct seat by means of assembly mandrel (049b).

69 Introduce righthand bearing outer race into rear axle housing until race rests against tapered roller bearing inner race (11).



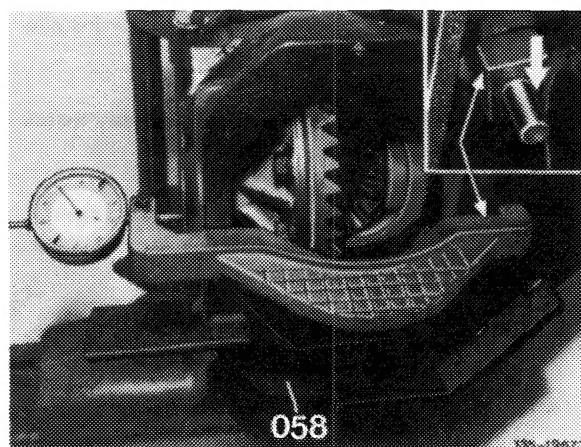
70 Attach spreading device to rear axle housing and tighten hex. screws to 40 Nm (arrows).



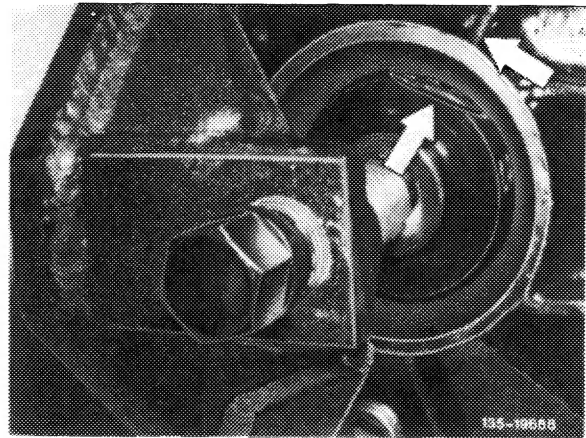
71 Place spread measuring device on fixture and set dial gauge at 3 mm preload to 0.

**Attention!**

Make sure that the stop pin of the measuring device rests well against contact surface on rear axle housing (refer to cutout, arrow).



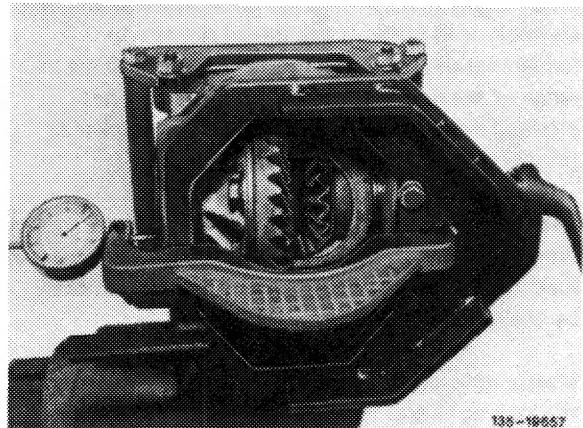
72 Turn one face of thrust piece toward web of rear axle housing (arrows) and manually screw-in threaded spindle up to bearing outer race.



73 Widen (spread) rear axle housing by 0.30 mm.

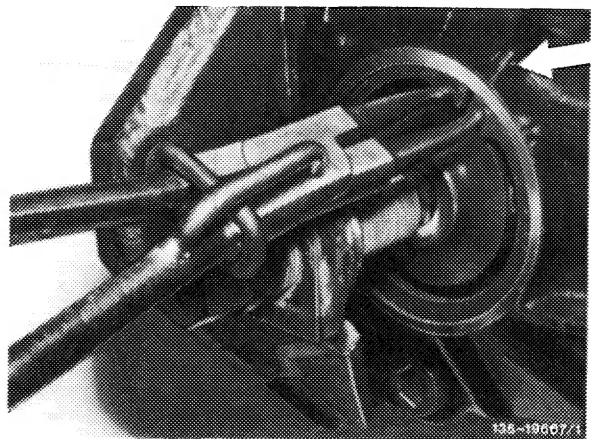
**Attention!**

While widening (spreading) do not exceed 0.30 mm.



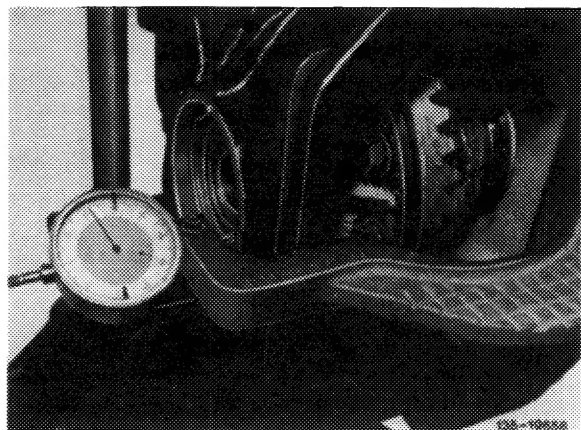
74 Insert previously installed locking ring into rear axle housing in range of web (arrow).

75 Slacken rear axle housing.



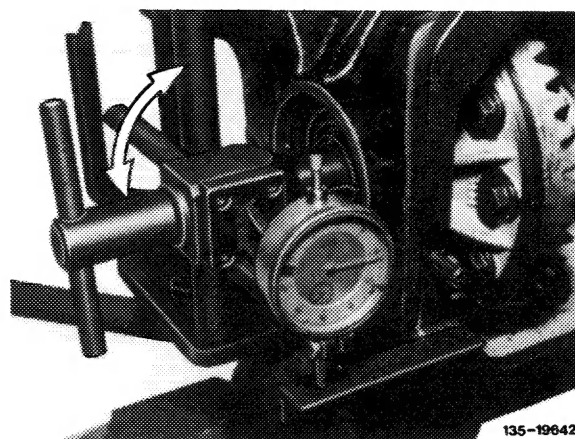
76 Again measure spread dimension (widening) of rear axle housing with spread measuring device. The required spread of rear axle housing and thereby the correct preload of tapered roller bearing on differential is attained, as soon as the spread is in range between 0.10–0.15 mm.

77 Remove spread measuring device.



78 Insert backlash measuring device into lefthand bore of differential housing and clamp down.

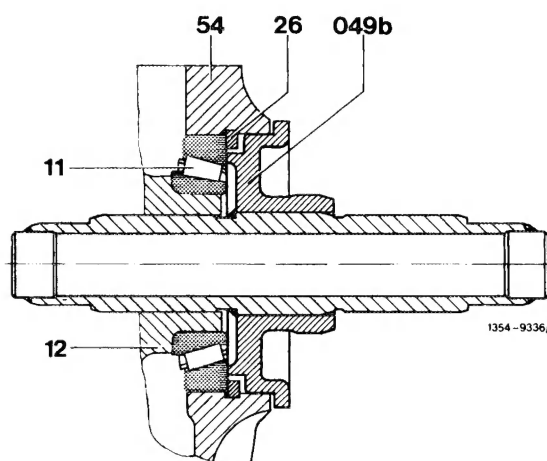
79 By moving dial gauge holder, measure backlash at 4 points along circumference of ring gear. The smallest backlash is decisive. **Backlash should be between 0.08–0.14 mm.** During each measurement, hold drive pinion in place at universal flange.



**Note:** Adjustment of tapered roller bearings and gear assembly is in order, if the spread dimension (widening) of rear axle housing and backlash are in range of nominal values. If these values are not attained, repeat adjustment using either thicker or thinner locking rings (26).

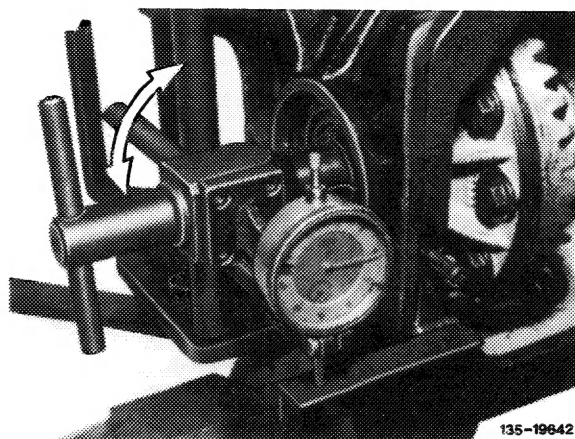
**Example 1:** If the backlash is in order, but the spread dimension of the rear axle housing is too low, the two locking rings on both bearing caps must be thicker by the same amount.

Measured value e. g. **0.05**, as a result the thickness of the locking ring at left and right should also be increased by 0.05 mm. This may lead to a change of backlash!

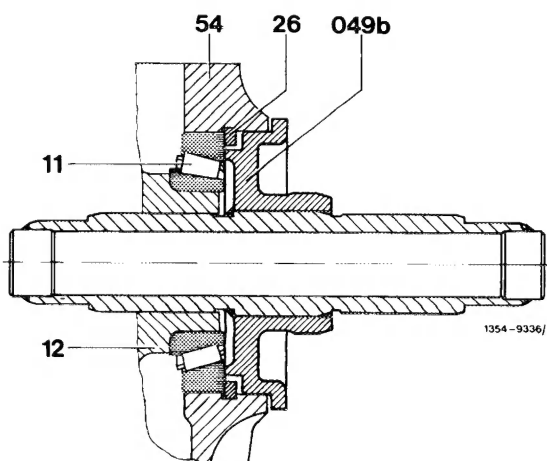


**Example 2:** If the spread dimension is in order, but the backlash is too high, the thickness of the locking ring at the right must be reduced by the respective amount and must be added at the left. If the backlash is too low, proceed vice versa.

80 Remove backlash measuring device and spreading device.

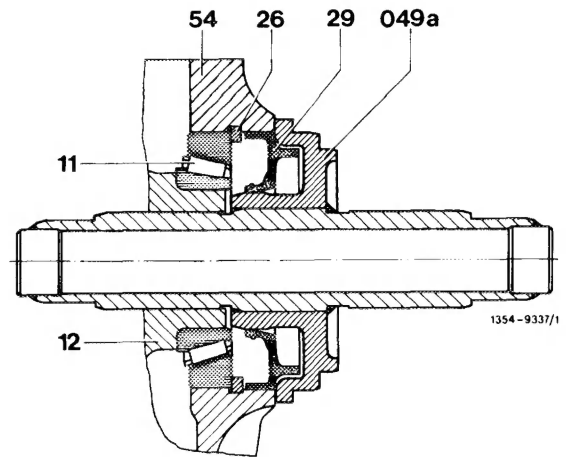


81 Check locking ring (26) for correct seat by means of assembly mandrel (049b).

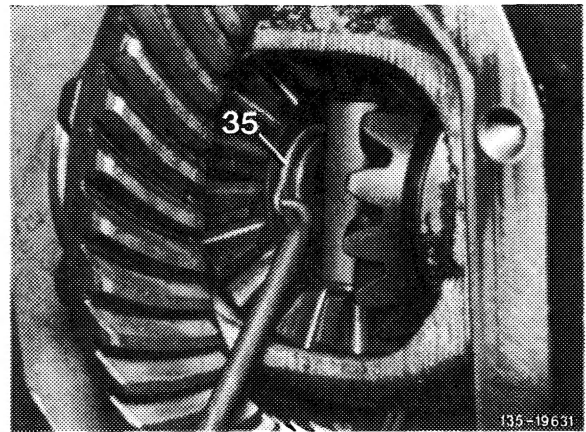




82 Coat rubber-coated radial sealing ring on OD with hypoid gear oil or rubber sliding compound "naphtalene H" and force into rear axle housing (54) by means of assembly mandrel (049a).



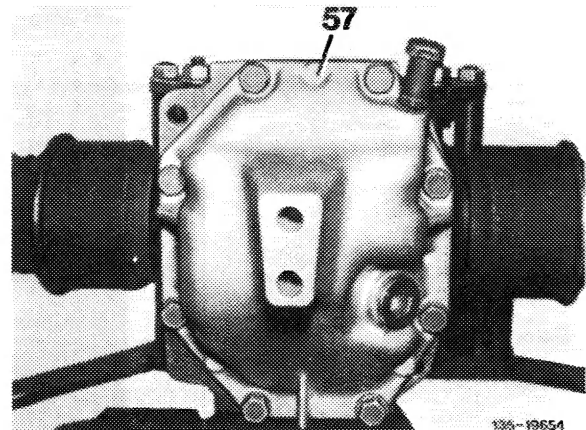
83 Install lefthand and righthand rear axle shaft with new locking rings (35) (35-620).



84 Clean sealing surface on end cover and on rear axle housing and coat with sealing compound. Mount rear axle end cover (57). Tightening torque of hex. screws 45 Nm.

85 Fill-in hypoid gear oil up to lower edge of oil filler hole.

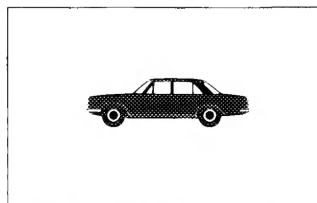
86 Renew breather on rear axle end cover.





# Data sheet

## Adjustment of rear axle gears



Branch/Agency

Customer

Chassis No.

Repair Order No.

Measurement carried out: Date/Name

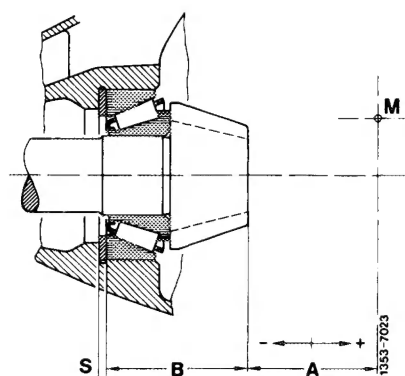
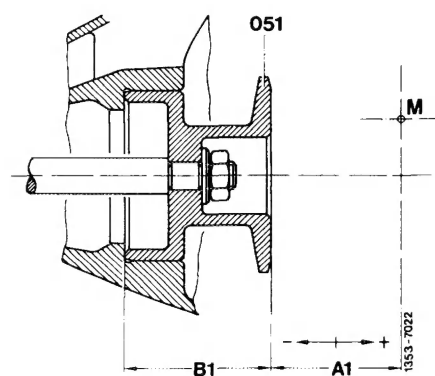
Date

License Plate No.

Original Registration Date

Type

Odometer Reading: km/miles



- A = Basic adjusting dimension
- B = Pinion height plus height of tapered roller bearing
- A1 = Distance from face of measuring body to center of ring gear
- B1 = Height of measuring body
- S = Thickness of compensating washer
- M = Center of ring gear
- 051 = Measuring body

### Computation of washer thickness "S"

1. Difference between measuring body height "B1" and pinion height with bearing "B". For drive pinion 39 mm high, add 1.5 mm.

==

2. Basic deviation "a" read on pinion (+ or -)

== +

== -

### Subtotal

==

3. Difference between adjusting gauge and depth of rear axle housing "A1"

minus direction  
plus direction

== +

== -

### Thickness of compensating washer "S"

==

=====

### Explanations and instructions

a) Each drive pinion and ring gear of a gear assembly is identified by a consecutive number written on both components.

b) Measure difference between measuring body height "B1" and height of pinion plus height of tapered roller bearing "B" and enter into table under item 1.

#### Attention!

On large center piece with pinion height of **39.0 mm** add (+) another **1.5 mm** (refer to example II).

c) Read basic deviation "a" on drive pinion and enter into column of table with respective prefix (+ or -) under item 2.

d) Add (+) or subtract (-) data of item 1 and item 2.

e) Measure difference between adjusting gauge dimension and depth of rear axle housing "A1" and enter into respective column of table (plus or minus direction) under item 3.

The directional data plus (+) or minus (-) refer to direction of rotation of dial gauge needle. A deviation from zero position in anti-clockwise direction means minus direction, in clockwise direction plus direction.

f) Only the basic adjustment dimension "A" is decisive for adjustment of the drive pinion. When checking the basic adjusting dimension "A" the drive pinion must be completely installed together with the spacing sleeve and the friction torque should amount to 120–140 Ncm for new tapered roller bearings and to 50–100 Ncm for used roller bearings. If the limit of 0.01 mm in plus direction and of 0.02 mm in minus direction from basic adjusting dimension "A" is exceeded, grind down compensating washer or install another compensating washer of appropriate thickness. In doing this it is imperative that a **new spacing sleeve** is used.

### Example I

**Computation of washer thickness "S" with small center piece and a drive pinion 37.5 mm high (version 1 with large center piece).**

1. Difference between measuring body height "B1" and pinion height with bearing "B". With a drive pinion 39 mm high add <b>1.5 mm</b> (measured value only).		≈ 1.4
2. Basic deviation "a" read on pinion (+ or -)		≈ + 0.20
		≈ -
<b>Subtotal</b>		<b>1.60</b>
3. Difference between adjusting gauge dimension and depth of rear axle housing "A1"	minus direction plus direction	≈ + 0.06 ≈ -
<b>Thickness of compensating washer "S"</b>		<b>1.66</b>

### Example II

**Computation of washer thickness "S" with a drive pinion 39 mm high (2nd version with large center piece).**

1. Difference between measuring body height "B1" and pinion height with bearing "B". With a drive pinion height of <b>39 mm</b> , add <b>1.5 mm</b> (measured value 0.10 + 1.5).		≈ 1.6
2. Basic deviation "a" read on pinion (+ or -)		≈ + 0.20
		≈ -
<b>Subtotal</b>		<b>1.80</b>
3. Difference between adjusting gauge dimension and depth of rear axle housing "A1"	minus direction plus direction	≈ + 0.06 ≈ -
<b>Thickness of compensating washer "S"</b>		<b>1.86</b>